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Gwynne's Renewable Heater.

The advantages obtained in the substitution of heaters for stores and dwellings, has been much talked of, but not very fully set forth, nor yet very clearly understood by many, and the objectionable feature have been carefully kept out of sight, because those interested have not had the means of surmounting the difficulty. The inventor has given this matter careful consideration, and in the construction of this heater has held the two principal points to be *pure air* and *safety*, then *sensitive action, durability, economy of fuel* and *space; facility for repair adaptability* to various *fuels;* these in their order are believed to be the most desirable points, and are claimedfor this apparatus, with what truth any person can satisfy themselves by examination.

The cleanliness of the house, by the absence of fuel, the extra space which the stoves would occupy, the advantage of heat stored, ready for use at any given point, the absence of smoke and smut in a coal burning region are known, but not generally appreciated; and yet a matter more important than these others combined, seems to have received no consideration. We will therefore direct attention to the *healthfulness* of a *uniform temperature.*

It is quite clear that no apparatus will accomplish everything, or fully answer all demands made upon it. A house properly warmed should have but little "drafts." If a room be warmed by a stove, it is well known that a door or window opened, and every little crevice seen under the door, is an avenue for cold air to come rushing through *to the chimney*, but with a steady stream of warm air coming into the room, they are avenues of escape for the surplus, and hence *no drafts.* Again—with proper warming the whole of the walls absorb heat during the active operation of the furnace, which they again impart during the night, thus assisting in keeping a uniformity of temperature, not otherwise attainable, and the purity of the air coming from the outside, and warmed in its progress, as compared to that of confined air shut in a room, and being heated and breathed over and over again, must be very clear to any thinking person.

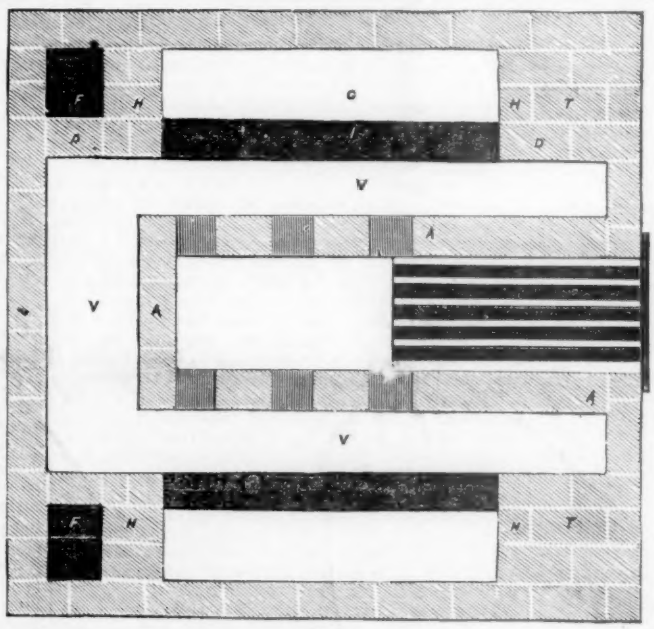

FIG. 1.

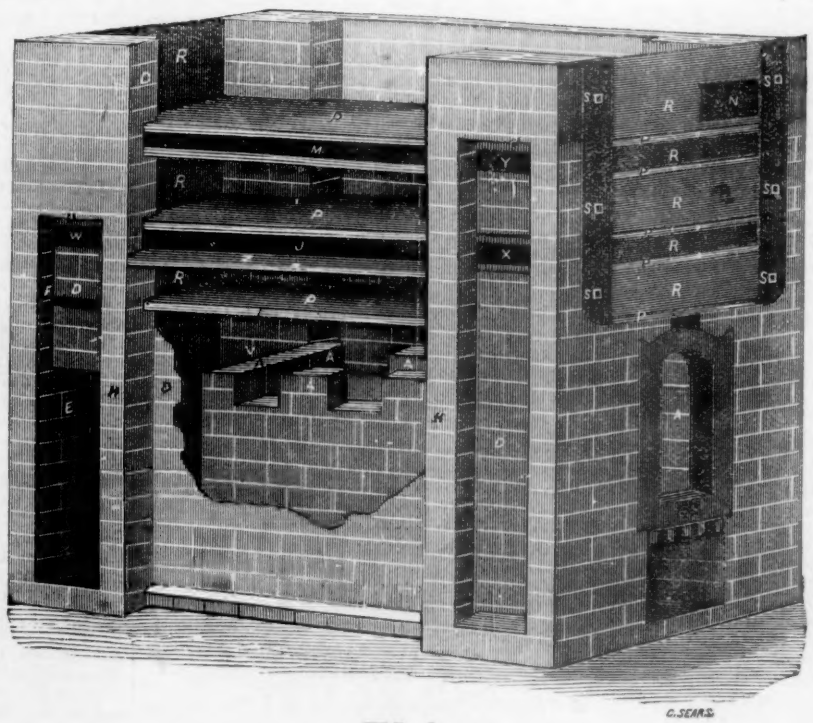

FIG. 2.

The drawbacks experienced with stoves have been measurably perpetuated by *bad heaters.* We place *pure air* as the primary consideration, for who will willingly put a heater in his dwelling that will insiduously *impair* the health of his family. Yet who will not remember the *sense of oppression* and *throbbing of the temples* so common to a room well heated, and the relief experienced on opening a window or door: but how few have reflected on *the cause.* Could they have seen the almost melted surfaces on which that air was heated, and understood how rapidly that surface was absorbing the life-giving oxygen of the air, the *cause* would have been clearly understood. The heater herewith represented, although so small, has much more radiating surface (the smallest size has about 100 square feet) so that it warms a larger body of air to a lesser temperature, and does not burn it. Rooms have been heated with this apparatus the past winter to 80 per cent and over, without experiencing any of the disagreeable effect alluded to, and herein lies its safety; the air is never hot enough to set on fire the wooden surroundings of the pipes, etc.

Its sensitive action, it is believed, is equalled by very few, and *surpassed by none. Five minutes* after lighting the fire, air at 100 per cent will pass a register, and its action thenceforth increases until the heavier castings get heated, and the latter continues to impart heat, after the fire is let down.

Its durabilty is secured by that peculiar feature of its construction from which it derives its name, "Renewable." It will be seen on examination, that only the lower "radiator" is liable to destruction, and this can be removed and replaced in *thirty minutes*, without disturbing any other part.

Its economy of fuel can only be proven by experiment. It must therefore be dismissed with this remark, that fire is made to traverse until it passes into the chimney at about temperature of the hot air. Its economy of space is shown thus—a furnace with 100 square feet of radiating surface stands on 5 x 6 feet. Its facility

of repair is shown in the fact that all the inside can be removed and all parts examined, without disturbing the brick work, and replaced in three hours. It can be worked with any fuel—wood, coal, or coke.

A reference to the engravings will explain the principle of construction, which may be summed up in these few words. The current of fire is spread out in three thin layers, while the air current is in like manner spread in the three alternating layers or more, if they be required, and the chimney permit.

Fig. 1 is a ground plan of the furnace, showing the fire box built of brick, in the sides of which, at the top edge, are several openings for the heat to pass out into chamber, V, under the lower radiator shown more fully at P, fig. 2. Several of these radiators are seen one above the other. They are made of plain sheets of iron, having their edges parallel, so as to slide into groves in proper castings secured in the brick work. When in place they are secured by the plates marked R, and nuts, SS.

The flues, E, F, W, at the rear co-operate with those at the front, X, Y., fig 2 in this wise. The fire or heat of the furnace rises and strikes the regulator, not shown, laying over or on top of the fire chamber made by the walls, A, A, A, (this regulator is in she form of a Venetian window blind,) and is deflected through the side openings beneath, or through the slats of the regulator directly into chamber, V, fig 1. It then passes under radiator, P, to the rear flue, F, thence up into flue, V, and back through flue M, and from thence into the smoke pipe. Now the air to be warmed enters at openings in the outer wall, and then ascending between the outer and inner walls, D, D, is stopped by the projecting flange on a level with the second radiator, which deflects it through the space between the first and second radiators, making its exit on the opposite side, ascending between the walls until stopped by a similar project ing flange of the third plate or radiator, and then enters between the third and fourth radiators, making its exit on the opposite side next to the observer again, and thence ascends into the chamber over the top of the radiator, which has a close cover supplied with the proper distributing pipes leading to the various registers.

Thus it will be seen this peculiar form of brick work, and combination of cast iron frame work, together with the sheet iron plates or radiators, effectually conducts the fire and air in alternate horizontal, and ascending their layers at right angles to each other. This gives a cheap, simple, and very effective heating apparatus, easily renewable in all its wearing parts. At the same time it is economical of fuel, and remarkably quick in its action or sensitive.

For further particulars, please address John Gwynne, Esq., Tiffin, Ohio.

An Electric Motive Power.

Mr. Greil, a French military officer, has recently made some interesting experiments with a new system of his own invention which is totally different from all other applications of electricity as a motive power. This new system is based upon a law of physics which governs the action of currents on currents. Up to the present time all inventors applied the use of the electro-magnet to the construction of their machines, but here one of the fundamental laws of dynamic electricity is put into practice.

If two currents are passed along two parallel conductors, one of which is fixed, in the same direction, an attraction will occur, and if the currents are sent in opposite directions then a repulsion takes place. Take a voltaic battery A, the fixed conductor is *a* and the movable one *a'*, the result will be that attraction takes place between *a* and *a'* with a power *f* that depends upon the force of the battery A. Take two other batteries, B and C, of equal force to A, with their conductors *b*, *b*,' *c*, *c*'; the same phenomena of attraction will be observed, equal to a force *f* for each battery. Unite at one end the movable conductors *a'* *b'* and *c'* and at the other end the fixed conductors *a*, *b* and *c*, and let the distance between the two ends be the same as that between *a* and *a'*. The movable conductor *a*, will be attracted not only by the fixed one *a*, but also by the other two fixed conductors *b* and *c*. That is it will be attracted by a force equal to treble that of the primary force or 3 *f*; *b'* and *c'* will undergo the same change. The movable end of the united conductors will thus be attracted by a force equal to 9 *f*. The force F thus produced will be equal to 9 *f* against a constant expenditure of 3 *d*, *d* being the expense in silver for each pair of voltaic batteries. The electric motive power alluded to is based on this principle. In the first place, the small voltaic batteries are replaced by two large batteries called *generators*, and the bundles of conducting wires by thick bars.

The generator is composed of a large basin of ceramic sandstone of a rectangular shape, containing a porous vase of a complicated shape, in order to expose as much surface as possible. A hoop of amalgamized zinc is placed between the porous vase and the outside basin, with a mixture of acid and water. The porous vase contains a piece of coke, of the same shape, in a bath of nitric acid. The fluids are kept at equal heights by means of reservoirs placed at each end. In fact, Mr. Greil's apparatus is but a Bunsen pile of huge dimensions.

The motion is derived from the electric source. Two conductors, one of which is placed on the positive pole and the other on the negative end, in a crank, which means the electricity is easily distributed to all parts of the machine, and even the motion can be reversed by changing the current. From thence the electric fluid passes into a movable distributor, by which the current is divided and automatically reversed. The current ends in two conducting bars that take the place of the conductors *a* and *a'*, previously mentioned. These fixed conducting bars, to the number of eighteen, are arranged so as to form the generators of a large fixed cylinder, and are bound together by cast iron hoops, from which they are isolated. The electricity passes through them all in the same sense and at the same time. On the inside of this fixed cylinder is a movable one, the generators of which are formed by twenty-four bars of metal corresponding to conductors *a'*, *b'* and *c'*.

When six bars of the movable cylinder are set opposite six bars of the fixed cylinder, the two intermediate bars of the fixed cylinder are opposed to three bars of the movable cylinder, at a distance of five, ten and fifteen degrees of circumference, and, therefore, six series are formed around the circumference of the cylinders.

If the current circulates in the same sense and simultaneously in the bars of the fixed cylinder by causing it to enter by one of the bars of the movable cylinder which we will call No. 1, and letting it escape by No. 3, two effects will be produced, one of attraction and one of repulsion, which will cause the movable cylinder to revolve one-fifth and place the bar No. 1 of the interior cylinder opposite the nearest bar of the exterior cylinder. The current is then put into No. 2 and let out of No. 4, giving a further motion of one fifth and so on. Every series will have the same effect, and being simultaneous the force will be increased.

The functions of the distributor consist in letting the current first into one bar and then into another. All the bars of the same number in the six series are united to a metalic conductor that ends in a movable distributor, giving therefore four different metallic conductors.

The distributor is a a drum of wood revolving on an axel, working in prepared bearings; metal hoops are placed on the outside, some of which are entire around the circumference and others interrupted by isolators, such as ivory, &c. On one side these hoops receive the negative and positive conductors from the generator, and on the other the four conductors communicating with the bars of the movable cylinder. The motion is given to the drum by means of cog-wheels that corresponds with the movable cylinder, giving it two complete turns to one of the cylinder.

Taking into consideration the question of economy by the use of such a motive power, calculations prove that the expense decreases in proportion to the square of the work produced, so that, presuming the unit to cost twenty-five times more to produce by electricity than by steam, the following table is obtained:—

POWER OBTAINED.	EXPENDITURE	
Horse power.	*By steam.*	*By electricity.*
2	D	D
16	8 D	2 D
64	16 D	3 D
250	125 D	5 D
2,000	1,000 D	10 D

Mr. Greil feels confident that his method can be applied very advantageously to railroads, and by means of an electro magnet of his invention, causing the electricity to work from the wheels of the machine on to the rails, he proposes to ascend any grade with the greatest facility.

A Company has been formed in London to supply Panama with water. It is estimated that the works will cost $300,000.

Compressed or Artificial Fuel.

In the grand economy of Nature there is no waste, but whenever her arrangements are disturbed by man, especially in the mining of coal, then, from the very nature of things, and the fact breaking up such mineral deposits by mechanical means, can be traced the unavoidable great waste always occasioned; and this is especially apparent to those acquainted with the workings carried on in the different coal fields in England and other countries, where millions of tons of slack, or lime coal, are annually lost, either by being left underground, or when brought to the surface allowed to run to waste, simply because it is an article of little commercial value.

Then, again, it is also a well-known fact that in the coal fields of Wales, Somersetshire, and the Forrest of Dean there are veins of coal in the measures yielding scarcely anything but lime coal, or slack, the working of which, from that fact alone, has yielded scarcely any or no profit after developement. Such properties, therefore, often after considerable sums of money have been expended on them have been allowed to remain in *statu quo* for years, and, doubtless, will remain so in a general sense until some scientific and mechanical principal can be profitably brought to bear, and this waste in lime coal be restored as nearly as possible to the original condition, form, and quality of block coal as found in Nature's veins. If this could be successfully effected the collieries which are now comparatively of little value would rise in importance, and be worth as much consideration from capitalists as collieries from which the best block coal is obtained; and this would especially be the case if the cost of manufactured fuel could be reduced to a scale which could compete with, or at least be equivalent to, the cost of obtaning coal in the usual way.

The development of collieries containing veins of coal producing mere slack, or small lime coal, and turning it, together with the waste slack made at collieries in general, into block by a patent process is a subject of vast importance, and to which too much attention cannot be given. It must, however be admitted that within the last few years considerable progress has been made in this department of modern manufacture, and no pains or expense spared to accomplish the grand object; however, while we feel it our duty to give credit to those who have devoted their time and money for the public benefit in this cause, and have paved the way for others to effect still further improvements, we, nevertheless, conceive that the subject is too compreshensive, and the field of investigation too extensive, to be eassily and readily exhausted.

Many persons of the present age devote themselves to a particular line of study, or to a subject in which probably they most delight, or from their natural capacity are fitted and rendered best adapted to produce useful and beneficial results; it does not however, follow that because an indivdiual has studied a particular subject for a long time improvements are the resnlts of his investigations No, for in many cases it is far otherwise; however, that the student in this city laboratory may by preseverance through Nature's laws and elements effect a great deal when on the right course of discovery is a fact which we freely admit; nevertheless, too much importance being attached, theoretical investigation renders the results generally obtained of less value than could otherwise be desired.

It is undoubtedly most condutive to the public good when the laboratory of science, combined with natural discrimination, keeness of observance, and a thorough practical knowledge, are found in persons who engage in the investigation of a subject that the most valuable results are obtained. We think the assertion is true, and we further believe we are justified in stating that we cannot discover that out of the many practical and thinking persons engaged in and connected with mining opperations at the different collieries in the United Kingdom but few, if any, are to be found identified as inventors with the subject of this article. We are the more surprised at this, as the class of men so engaged, of all others, are, from the very nature of their occupation, best qualified to adopt means to an end in mining and its concomitants, especially for the pupose of turning waste elements into a profitable article of commerce.

For a long time past a process which would effect the purpose desired has been sought, but, although many patents have been taken out for compresing small coal into blocks, the public have not received them with so much confidence as the different inventors could have desired or claimed for them. A new patent process, however, is about to be introduced by Messrs. Hoskold and Wheeler, for which they have obtained patents in Great Brittain, France, and Belgium, and it may here be observed that the patentees are, one of them a mining, and the other a mechanical, engineer. Anything of the kind, therefore, coming from

them would seem to imply practical success. It is claimed, and apparently with justice, that this is the best patent process hitherto discovered. Many specimen blocks of the fuel made by this process have been tested, and are considered to be of excellent quality; indeed, so sanguine are the inventors of the success of this invention that it is their belief it is destined to supersede all other processes hitherto introduced.

Sounding Flames.

The readers of Tyndall upon sensitive flames are now pretty well known to the public, through the publication of his great work on sound, by Messrs. D. Appleton & Co., and it has become very desirable to know how to preform some of the experiments without the necessity of procuring expensive apparatus.

A. Weinhold, of Chemnitz, recomends a very simple contrivance, within the reach of every chemist. In order to obtain flames of great sensitiveness to tones or noise, with ease and certainty, without the help of an apparatus for the production of a stronger pressure than is afforded by the gas manufacturer, certain precautions are necessary.

A pressure at least an inch and two-tenths of water is necessary to the production of a sensitive flame, and as this cannot always be had, a gasometer can be contrived out of a bell jar suspended by a cord running over a pulley with a scale pan attached to the end for weights, with which to regulate the pressure. The bell jar can be dipped into a large vessel, and filled with gas by syphon. A three gallon jar will furnish sufficient gas for more than a minute, and can be easily replenished.

Weinhold recomends the observation of certain precaution in the performance of the experiment:

1. The flow of gas must be through capacious tubes, so that the pressure can not be deminished near the burner. A half-inch tube is necessary if the pressure does not exceed one and a quarter inches. The india-rubber tubes must also be sufficiently capacious.

2. The gas where it flows out must not make the least noise. Such an effect is sometimes produced by the roughness in the sides of old tubes or imperfection in the stop cocks.

3. The burner must be a simple hole with a wide opening, a sharp angle and smooth sides. Glass tubes drawn out to five-hundredths of an inch in diameter can be made to serve a very good purpose. A cylindrical piece of soap-stone can always be made to serve better than glass, as it is not liable to crack and break.

The best results are obtained with a burner the inner diameter of which at the point of ignition is 0.08 of an inch, and in a lengh of one inch widens to two-tenths of an inch. Such a burner consumes 19 cubic feet of gas per hour, and gives the flame 19 to 23 inches in length. At every noise the flame shortens and divides itself into two distinctly seperable parts—the lower, cylindrical, quiet—the upper, wide, illuminated and rustling.

By uttering hissing consonants, the flame is shortened one-half; OO in deep tones has no effect; A and Ae act powerfully. The rustling of tearing of a piece of paper, the striking together of two pieces of glass, the ring of a bundle of keys, the ticking of a watch, all produce a marked drawing together of the flame. A shrill whistle causes the flame to assume a swallow-tail shape.

If the experiments are conducted in this way it is necessary to avoid the use of any noisy burner, but to employ a candle. All draft and currents of air must also be avoided. With all of these precautions a very entertaining series of experiments can be performed, and flames can be invented to correspond with every note, consonant and vowel. The recitation of poetry will cause the flame to dance up and down as often as the letter S or some note is reached to which they respond. It has been proposed to place behind a row of flames a sensitive piece of paper on which the sound of the voice could be photographed, and in this way we should have a perfect record of man's speech. Such an invention has not yet been worked out, but as it is not in the least more wonderful than ordinary photographs, no one can pronounce it imposible.

The application of sensitive flames to the tuning of instruments has yet to be made, and when it is finally accomplished will prove to be absolutely correct, as the faintest variation in a note will affect a flame, and thus make itself apparent long before the ear could detect the discord.

The Darien Canal Business is still in a muddle, although its friends continue to think that it will come out all right, so far as governmental negotiations are concerned. In the meantime a resolution has been offered in Congress to authorize the President to appoint a commission "to examine into the practicability and best method of establishing a ship canal at the Isthmus of Darien.

Statistical Items, showing Receipts, Expenses, and Profits of the two Gas Companies of St. Petersburg, Russia, with amount of Gas produced, and Coal and Coke consumed, Etc., during the year, from May 1st. 1867 to May 1st, 1868.

I. Old Gas Company.

Receipts: 1. Gross amount of gas produced during year.....122,649,855 cub. ft.
Deduct loss, 15 p. ct..... 18,339,677 cub. ft.

Actual amount of gas sold...114,310,177 cub. ft., which brought Rbles. 304,390
2. Amount of coke sold..... " 60,938
Total amount of receipts.....Rbles 365,328

Expenses: a. Coal bought 958,686 poods at 13⅞ to 19 copecks, Rbles. 135,122
b. Coke bought 281,891 " " 8 copecks..... " 22,551

Total..1,240,577 " coal and coke..... Rbles. 157,673
c. Salaries, wages, lighting Works, repair of buildings, office hire, insurances, etc., etc..... " 90,150
Total amount of expenses..... Rbles. 247,823

Profit of old gas company during the year ..... Rbles. 117,505

II. New Gas Company.

Receipts: 1. Gross amount of gas made during year.....354,202,850 c. ft.
Deduct (a) gas used in lighting factory, works, etc..... 2,499,100
(b) Loss in town.....23,836,623 = 26,335,723 c. ft.

Actual amount of gas sold.....327,867,127 c. ft. Rbles. 850,512 03
2. Gross amount of coke sold, etc..... " 98,430 16
Total amount of receipts..... Rbles. 948,942 19

Expenses: 1. For 1,989,926 poods Newcastle coal at 12 to 12½ copecks .....Rbles. 247,916.99
2. For 225.867 poods Kennel coal at 25½ copocks..... " 57,509.59
Total, 2,215,793 poods of coal bought for.....Rbles. 305,426.58
3. Materials for cleaning gas, repair of apparatuses, salaries, wages, etc., etc..... " 127,466.00

Total amount of expenses..... Rbles. 432,892.58

Profit of the new gas company during year..... Rbles. 516,049.61

Recapitulation: Gross amount of gas produced by both companies during year, 476,852,704 cub. feet.
Gross receipts of both companies together, during year, Rbles. 1,314,270.19
Amount of profit, both companies together, during year, Rbles. 633,554.61 (being nearly one half of the receipts.)

Creosote as Fuel.

For a long time past says *Morgan's British Trade Journal*, creosote has been almost a drug in the market, the demand for it for the chief purpose to which it had been previously applied, viz., as a preservative of timber, having almost ceased with the completion of the great railways, and the depression in the railway interest which has of late years prevented the further developement of that branch of commercial enterprise. The gas campanies have been glad to get rid of it on any terms, and that which had for some years been a valuable refuse of gas manufactured became almost worthless. Its application to heating purposes, for which it seems admirably adapted, will, however, probably restore equilidrium of value which the cause refered to have temporaily disturbed, and at the same time introduce a fuel which, where a very extreme temperature is required, promises largely to supersede the use of coal.

At Mr. John Schwartz's sugar refinery in Pelhan st., Spitilfields, more than 1,000 gallons of creosote oil are daily consumed in heating his two furnaces, which are of 140 horse power, and he speaks of it as a most successful experiment. According to his calculation, 220 gallons of the oil, the cost of which is 1d a gallon, equal in heating-power two and a half tons of coals, and 1 lb of the oil will evaporate 13 lbs of water, whereas 1 lb of coal will only evaporate 7 lbs of water. As a matter of course, care is required in the mode of, or rather in the arangements for using it, but if the directions are followed out, it is not only more economical but more cleanly, and in all respects far less offensive than any other kind of fuel, emitting neither smoke nor smell.

Mr. Schwartz's furnaces are supplied from a large tank, from which the creosote flows through a pipe into the furnace, along the sides of which it is propelled by a jet of steam. Coming in contact with the fire (of which there is a small basis in the shape of a red hot coke and brick), it ignites, and burns fiercely with a pure white flame; and the combustion, being perfect, leaves no residuum of any kind. It should be added, as another economical feature in the use of creosote oil, that, as applied to the furnace in question, no stoking is necessary, consequently stoker's wagers are saved; and, again, no expensive apparatus is required to comply with the Smoke Nuisance Prevention Act, since there is none.

Practical Application of Sensitive Flames.

An apparatus has been invented by Barrett for making practicle use of sensitive flames. It consists of two perpendicular copper rods, one of which, on its upper end, holds a metallic ribbon, which is composed of thin leaves of gold, silver or platinum, welded together. Such a ribbon expands unequally under the influence of heat; it bends toward one side, and, in doing so, comes in contact with a fine platinum wire attached to a galvanic battery. As soon as the holes of the battery are closed, a bell begins to ring. The working of the apparatus is as follows:

A sensitive flame is lighted, about ten inches from the metalic ribbon. This burns quietly so long as there is no noise, but a shrill whistle, or any unusual disturbance will cause it to diminish one half in length and to spread out wide in the middle, like the wings of a bird. It thus heats the metallic ribbon, which expands unequally, and occasions the contact of the poles of the battery, which rings a bell. Such a light as this in a banking house would betray to the watchman the noise of robbery, and the inventor proposes to use it as a species of burglar alarm. As sound can be transmitted in water four times as rapidly as in the air, it is also suggested to employ this method on shipboard, to make known the approach of a vessel in time of a fog.

There is probably the germ of curious applications of sensitive flames in Barrett's invention, and it would not be surprising to hear of its use in war to warn a sentinel of the approach of the enemy, or of its application to a new species of telegraphy.

Size of London.—It has 320,000 houses. Its streets would, if placed in a line, reach from Liverpool to New York. It has 300,000 street gas lumps. It uses 44,000,000 gallons of water per day.

Annual Report of the Inspector of Illuminating Gas,

TO THE MAYOR AND CITY COUNCIL OF BALTIMORE.

[We publish the accompanying report in full inasmuch as it embodies in a consise form, information which will be interting to those who make gas matters a study or a business. The ideas which the Inspector Mr Aikin throws out regard to the effect of glass shades to diminish light, and the value of hydrocarbons to increase the illumination of gas are correct and appropriate.—Eds].

OFFICE INSPECTOR OF ILLUMINATING GAS,
Baltimore, January 1, 1869.

To the Hon. Robert T. Banks, Esq., Mayor, etc.

Sir: The undersigned begs leave to present the accampanying tabular statement as embodying the average of the observations on the illuminating power, chemical purity and pressure of the gas supplied during the past year by the Baltimore Gas Light Company. The examination of the gas has been made, with very few exceptions, every day. Each day's record has represented the average of five distinct observations, which give from 120 to 130 for each month, and about 1,500 for the year, as data from which the accompanying summary has been compiled. The average illuminating power of the gas during the year has been constantly above, and during the last six months very far above the standard established by the ordinance. The photometer employed has been the usual Bunsen instrument, the English standard Argand burner being used for the gas, and the standard spermaceti candle for the unit of light. As the light obtained from ordinary burners is generally far below that of the Argand, the unthinking are apt to be disappointed in the illuminating power of the gas when its quality is but little above the standard.

Twelve candle gas, as usually burned, might not give more than the light of 8 or 9 candles, and would lightly give rise to every general complaint. But, as long as the present high grade is maintained, there can be no just cause for dissatisfaction. The chemical purity of the gas has been examined about once a week during the year. Had there been any serious defect in the light-giving power, such examination would have been made more frequently. The sulphur impurity, limited by the ordinances to 20 grains in the 100 cubic feet, was sought for by the combustion process and estimated as sulphate of Baryta. The quantity found ranged from 2.5 grains to 3.75 grains to the 100 cubic feet, showing remarkable purity in regard to this, the most objectionable of all foreign matters that contaminate gas. Carbonic acid gas, which interferes with the light-giving power of the gas more than any other impurity, (1 per cent. causing a loss of 6 or 7 per cent. of light,) has not been detected in any notable proportion at any time. Sulphydric acid, or sulphuretted hydrogen, has also been steadily absent. The one foreign matter most constantly present in unnecessary quantity has been ammonia. But, as this is not prohibited by the ordinance, perhaps it cannot be legally considered an impurity. Its presence, nevertheless, is unquestionably objectionable, both from its injurious action on the light, and from its chemical action on brass fittings. Notwithstanding this drawback, the character of the gas, as already observed, has been for many months remarkably good. That complaints are occasionally heard is not surprising; but they furnish no conclusive evidence against the gas. The amount of light that can be procured from a given bulk is dependent on the conditions under which it is burned; and it necessarily follows that when the conditions required for the best combustion are neglected or ignored, a larger bulk must be consumed to supply the light needed. The form of the burner will materially influence the amount of light from a given volume of gas. Five cubic feet per hour passed through one burner may give the light of only 10 candles, while the same quantity passed through another burner may give the light of 15 candles. The amount of pressure under which the gas issues also materially influences the light, and, at the same time, bears a close relation to the form of the burner. Where the pressure is a fixed quantity, one burner will give vastly more light than another, both consuming the same amount of gas. This subject of pressure is a consideration of the first importance. Where it is under control, a diminution of excessive pressure will very greatly economize the consumption of gas and increase the light obtained. However important this question may be for the private consumer, this is wonderfully enhanced if referred to the interests of the city. If the gas burned in the city lamps is rated at 3 feet per hour, and the actual consumption is 5 feet per hour, great injustice is done to the Gas Company. Or, if the burners are rated at 5 feet per hour, and the actual consumption is only 3 or 4 feet per hour, the city must pay for a great deal of gas that is not supplied. As there is no difficulty in determining how much gas of given density will pass through a given burner, under a given pressure, in a given time, there is no reason why there should be any great difference between the amount paid for and the amcunt supplied. The pressure on the street mains being beyond the control of the consumer, the most that can be done is to adapt all arrangements to the existing pressure. The best form of burner for the ascertained pressure being determined, and the rate of consumption carefully noted, the light obtained would be the best that could be supplied by the gas burner under those conditions, and the gas bills would represent, as nearly as possible, the amount of gas actually consumed. Complaints of deficient light are sometimes heard from those who use glass shades around their gas flames. The light lost by this means would be incredible if the facts had not been well established by experiment. The use of a clear, plane glass shade involves a loss of from 15 to 20 per cent. of light; with a ground glass shade the loss is from 25 to 35 per cent., and with figured shades it may rise to 50, or even 90 per cent. Besides the mere obstruction of light by the shades, they often act very injuriously by their peculiar form. Irregular currents of air are established, which, entering below to feed the flame, keep that constantly flickering, taxing the eye sight more painfully than the diminished light would do, if that came from a steady source. There seems good reason for supposing that the expense of the city for lighting might be materially reduced by the use of the carburetting arrangement as supplied by the American Improved Gas Light Company. Though not at present applicable to street lamps, yet, for all public buildings as City Hall, court Houses, Station Houses, Jails, &c., there seems no room to doubt that a saving of 25 per cent. at least on present bills could be effected by introducing the carburetting arrangement. As it is now in use in many large hotels and private families, in the Treasury Department, Patent Office, Postoffice, and public printing officers in Washington, the above estimate of the economy of the plan would appear to be based on reliable data.

In conclusion, I must beg leave to suggest for your Honor's consideration the very inadequate compensation assigned to the Inspector of Illuminating Gas. The salary, so every disproportioned to the service rendered, and the responsibilities of the duties, was arranged before our present depreciated currency existed, and has remained unchanged It is believed to be the only instance of the kind where the pay of the city official has not been increased in accordance with present altered values; and I would respectfully request your Honor's recommendation to the City Council to arrange this matter more in accordance with the claims of justice. In case the city authorities desire to have the chemical examination of the gas continued in future, it will be necessary to provide a small appropriation for the purchase of the chemicals and glass ware required for the work. So far as I am aware, nothing of the kind has been purchased since the first appropriation in 1861, and the supply then provided has been exhausted. The sum of fifty dollars will be probable sufficient for the purpose.

Respectfully, &c.,
WILLIAM E. A. ATKIN, M. D.,
Inspector of Illuminating Gas.

A Gas Engineer Commits Suicide.

Westchester county furnished an additional tragedy on the 27th ult., which for determined self destruction has certainly no parellel. The victim who has fallen by his own hand was Charles H. Starr, well known in the village of Tarrytown, where for the past eighteen months he has acted as superintendant of the gas works at that place. Being a young and energetic man, deceased was entrusted with the practical management of the gas works, and it was generally understood gave entire satisfaction to his employers. Of late, however it is known that he forgot himself so far as to drink immoderately, but invaribly abstained from the habit during business hours, so that no complaint of neglect of duty was thought of by the company. As he was a genial, social disposition, it is now believed that continued dissipation led him to contract debts and otherwise involve himself pecuniarily, which preyed upon his mind and drove him to the act which determined his life. Other causes are alleged for the self-murder of Starr, all reports agreeing in the fact that latterly he has appeared unsettled in mind.

The deceased left his boarding house as usual yesterday morning, at half past six o'clock, and according to the testimony of his wife, given before Coroner Smith and a jury, he appeared low spirited. The same witness also testified to the deceased's remarking that mattters were going worng at the gas works; adding that if his life was insured for $5,000 he would not be long in this world. After going to the office as was his custom, deceased before proceeding to the gas works borrowed a pistol containing six chambers from a friend, saying that he wished to shoot a cat. With the loaded weapon in his possession Starr then went to the gas house, and after waiting until the employes had gone to breakfast he proceeded to deprive himself of existence. From the testimony of Dr. Delgairns, who made a post mortem examination of the body, it would appear from the wounds that deceased first shot himself in the right side of the head, the ball glancing from the skull and penetrating the scalp, making a wound of about two inches in length. Finding that ineffectual, he fired again, the ball striking in the centre of his forehead, fracturing the frontal bone, and causing compression of the brain; the ball remaining partially embeded in the skull, from whence it was extracted in a flattened state. As the second shot did not produce instant death, the left breast received a third bullet below the heart and near the fourth rib: and this not having the desired effect the pistol was lowered to the fifth rib, and the fourth leaden messenger passing through the lungs, penetrating the bornchial artery, caused instant death, from excessive hemorrhage. When found deceased's vest was on fire and the revolver lying by his side. As his watch was missing it was at first thought he had been robbed; but it was subsequently ascertained that he had left it for repairs on Monday evening.

After a short deliberation the jury returned a verdict, "that deceased came to his death by pistol shot wounds inflicted by his own hand, while laboring under temporary depression of mind." Deceased was about thirty years old, and a native of Peekskill.

A New Photometer.

Various contrivances have been invented with a view to measure the intensity of light. The earliest photometer invented consisted, *Galignani* says, of a series of glass plates, through which the ray of light was made to pass; the number of these panes necessary to deaden it completely constituted the measure of the intensity. One point to be aimed at is an absolutely uniform source of light. In the ordinary process of photometry the standard used is a candle defined by Act of Parliament as "a sperm of six to the pound, burning at the rate of 120 grains per hour."

This test Professor W. Crooks condemns as being too variable, and recommends the following instead: A glass lamp is taken of about two ounces capacity, the aperture in the neck being a quarter of an inch in diameter; another aperture at the side allows the liquid fuel to be introduced. This consists of alcohol of the specific gravity of 0.805, and pure benzol boiling at 81° Centigrade, mixed together in the proportion of five volumes of the former and one of the latter. The wick holder consists of a platinum tube, and the wick is made of fifty-two pieces of platinum wire, each one-hundreth of an inch in diameter. The flame of this lamp forms a perfectly shaped cone, the extremity being sharp, and having no tendancy to smoke; without flicker or improvements of any kind, it burns when protected from currents of air at a uniform rate of 136 grains per hour. Professor Crookes now describes an apparatus of his, intended to replace the usual photometers. It is not easy to describe it without a figure, but we may generally state that it rests on the Arago and Babinet principle of using polarized light for the purpose. The apparatus consists of a couple of pillars sliding along a graduated stem. The standard lamp is placed on one of them, and moved along a bar to a convenient distance, depending on the intensity of the light to be measured. That which is to be compared to the standard is then fixed in a similar way on the other side of the instrument. Now, on looking through the eyepiece of the apparatus, two brightly luminous discs will be seen of different colors; one of the lights is then slid along the scale until the two discs are equal in tint. We now need only mark the distances, and square them, when by a well-known rule the ratio of the two numbers obtained will be the inverse one of the intensities, one of which being found, the other is obtained by the rule of three.—*Morgan's Brit. Trade Journal, May.*

A Singular Effect of a Gas Explosion.—At 11 o'clock on Tuesday morning, the 18th ult., a singular gas explosion occurred at No. 110 Myrtle avenue, in the apartment of Mrs. T. E. Johnson. It appears a gas-fitter had been at work in the place and had neglected to stop a leakage. The apartments became filled with gas, when it ignited from one the gasfitter's lamp. The force of the explosion was so great that it blew Mrs. Johnson out of a rear window, and she fell upon a shed beneath. Very fortunately she escaped with but slight injuries. The wiudows of the apartments were blown out and the furniture set on fire, causing a damage of $100 before the flames could be extinguished, The building, which is owned by Mr. W. J. Heterick, was damaged to the extent of $100.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—Eds.]

Obstructions in Stand Pipes.

Halifax, N. S., May 12, 1869.

Messrs. Editors: In reference to the difficulty experienced by Mr. Woodruff in keeping the stand pipe clear, I think Mr. Somerville has explained the cause of obstruction; and I would advise Mr. Woodruff, instead of continually burning out the pipe, to try this simple plan: Let the firemen get some very fine coal (the finer, the better), let him *test it thoroughly* with water, and immediately after putting in the charge into the retort, let him throw, say two shovels full of this *fine wet* coal into the mouth piece, then secure the lid, and if this is done, say twice every twenty-four hours, I think it will cure all the obstruction, at least it always does so with us.

I am, yours respectfully,
George Buist,
Manager Gas Works.

Gas Works, Port Morris, May 17, 1869.

Messrs Editors: When the retort is empty let the man take the stopper out of the pipe, and with a three quarter inch round rod, made red hot, let him pass it up from the mouth-piece through the tar, which he can do in two or three heats. Having made a hole in the tar it must be kept open by passing the red hot rod up so as to allow the heat from the retort to pass up the pipe; at the end of three hours he can stand on the bridge-pipes, and with an inch pipe made flat at one end, he con drive the tar or pitch down, leaving the pipe quite clean. This plan have been in use here the last eighteen months, and always with the same result. The advantages are, one man can clean his own pipe, without exposing himself to the severe labor and filthy smell when cleaning stop pipe the old way. Should you think it of use, you are at liberty to publish.

I am, respectfully,
William E. Hase.

New Purifying Process.

[We are glad to give place to the following correspondence, because it seems to indicate a new purifying agent, not heretofore known or used to our knowledge. When leisure will permit, we shall look into the chemical conditions and changes involved in this process. In the mean time some of our readers may be able to throw more light upon this subject.—Eds.]

Ironton O., May 24 1860.

Messrs. Editors: While the Board of Health has been waging war on the gas works of your city, we have been experimenting a little, with an eye to avoiding a similar war at some future period.

As the result of our investigation we have a purifying material that costs us not one cent. It is simply grind stone dust, which can be obtained in any town or city where there is a nail mill or hoe factory, or where any polished tools are made or edged tools ground. As we have both a nail mill and hoe factory in our young city, we are supplied abundantly.

That which we get at the nail mill is dry, white, and about as fine as cornmeal. We give it a thorough wetting with water, expose it to the atmosphere for a week, spread it on a floor, pass a cast iron roller weighing about 400 lbs. over it, dampen it to about the same consistency as the dry lime, and the dust is ready for use On the lower tier of trays we use common clay or loam, merely to arrest the tar and naphthaline that may have passed the condensers, and keep it from saturating the dust, which would prevent it oxidizing. The two upper tiers of trays are covered to about the depth of two inches with the prepared dust. We have about ten bushels, which we have been using over two months. It has purified about 500,000 cubic feet of gas, and is better to-day than the first day we used it. Formerly when we used dry lime we changed the material about three times in the same length of time that we now change twice. With lime we always considered we were doing pretty well when our third purifier did not color lead paper; now we never allow our second box to color it. When the dust is removed it is put through the same process as before, except the first wetting, and it is again ready for use. The material is not more offensive to shovel from the boxes than shoveling dirt out doors. If there is a better or more economical material in use we would like to know it.

Respectfully, E. M.

Automatic Water-Engine.

An important discovery connected with the rising of water is claimed to have been made by Dr. Bouron, a physician of some reputation, residing at Heberville, Seine Inferieur. It appears that by a very simple piece of mechanism he can raise a continuous stream of water to almost any altitude, without labor of any kind, and without expense, beyond that necessary for the first cost of the machine, and this is by no means large, considering the amount of useful work which it yields. Dr. Bouron states that the power of the machine is based upon a natural and immutable mechanical principle, and that by it there may be created a continuous current of water at the surface of the soil, wherever there exists, no matter at whatever depth it may be, a spring of water. The machine is intended to supersede all existing pumps, its construction not being more expensive, whilst it has the additional advantage that no expense is incurred for keeping it constantly and usefully at work, although other pumps, especially when the water is raised a great height, necessitate enormous expense compared with the useful effect produced, and that, too, during the whole time they are at work. It must not be forgotten, however, that it is a stream and not a jet of water which the new machine produces, so that, although it would be well adapted to supply water to fire-engines, for example, it could not replace them. It is claimed that the machine will yield the same quantity of water as that being produced by the spring to which it is adapted (less, of course, the loss inseparable from the working of all mechanical apparatus), and at any height, whether it be 1000 metres, 2000 metres, or more. Dr. Bouron also observes that, however, paradoxical it may appear, he has found "the greater the height to which the water has to be raised the greater is the power of the machine." But the relative proportion of the power to the speed is quite in conformity with the principles of machines. The greater the height to which the water has to be raised the greater the power and the speed that can be brought to bear upon it; but the greater the horizontal section of the column of water to be lifted the more will the speed diminish. As Dr. Bouron has not yet protected his discovery the mechanical details cannot at present be given; but at no distant date they will, doubtless, be published in the Journal.—*London Mining Journal, May 25.*

[We will be happy to see the details of this wonderful *Self elevator*. If the principle is correct it will be no trick at all to pump a "stream" of water to the moon.—Eds.]

Important Action of the Brooklyn Water Board.

At a meeting of the new Board of Water Commissioners, recently held, the following resolutions directing the repaving of seven of the leading streets of that city were adopted:

That proposals to repave the following streets be advertised for, bids to be received until the 31st of May, at noon:

Pierrepont street, from Willow to Fulton, with Nicholson pavement.

Montague street, from the bridge to Court street, with Scrimshaw concrete over the present pavement.

Schermerhorn street, from Clinton street to Flatbush avenue, with Nicholson pavement.

Columbia street, from Atlantic street to Hamilton avenue, with Belgian pavement.

Livingston street, from Columbia street to Flatbush avenue, with Scrimshaw concrete over the present pavement.

Fort Greene place, from DeKalb avenue to Atlantic street, with Nicholson pavement.

Henry street, from Fulton street to Fourth place, with Scrimshaw concrete over the present pavement.

It was also provided that gas and sewerage connections should be made on the line of the improvements, wherever they were found to be wanting.

Explosion of the Meter of the Cincinnati Gas Works

[*From our Correspondent.*]

A few minutes past twelve o'clock, on the 24th ult., the citizens of Cincinnati were startled with a dull, rumbling, explosive sound; it came from the south-west part of the city, and dense volumes of smoke arose from that quarter. The engines came out, but their services were not required. The gasometer of the city gas works exploded, and the huge iron holder, 150 feet in diameter and 42 feet in height, with a capacity of half a million cubic feet, was torn in pieces. The cause is unknown. The explosion commenced on the north side, next to Front street. Ten or twelve workmen, who had been painting the holder, had just descended, and were standing by the engine house, but miraculously escaped with their lives and without serious injury. Pat McKenxie, an employé of the gas company, was on the top of the column, on a level with and nearly touching the top of the gasometer. His clothes were all burned off and his entire body was crisped, which caused his death in three hours. Dick and Pat Sheriden, who were driving lumber carts near the scene, were burned severely, and also their horses. The men will recover, but the horses will probably die. Charles Kelly, who was walking on the opposite side of the street, was badly burned. Trees forty feet distant were scorched, and the neighboring holders were injured by the concussion, one of them so badly as to leak a large amount of gas. The buildings near were scorched, but except starting the roof of one no other damage was done. The report was heard at a great distance. Crowds of people have been to witness the wreck, and much excitement prevails. The loss to the gas company will be about $75,000.

The explosion is not accounted for by even the best informed gas manufacturers. When it occurred there was no fire in the cauldron and no gas had been let into the holder for six hours. One theory is that of great expansion of the gas by solar heat on the holder, the consequent bursting of the roof and flame communicated to the escaping contents from the stack of the Globe Rolling Mill. The idea has quite generally prevailed that there is no danger of an explosion to a holder. Several instances would seem to refute this. In October, 1865, a gasometer of the London Gaslight Company's Works, at Nine Elms, Battersea road, exploded, killing ten men. It was twice the size of this. Not long since, we are informed, there was a similar explosion at Chicago. Both these explosions, however, were accounted for, the fire communicating from the governor in the first instance. How this ever occurred no one seems to know. The officers and employees of the works are puzzled and cannot solve the mystery. The theory above given seems plausible. The explosion could not occur until the gas had become mixed with atmospheric air, and it does not seem likely that could have occurred, save in the way mentioned.

[It is possible that the exhauster by some means forced air into the holder, which finally became mixed with the gas in such proportion as to become explosive by means of a carelessly lighted match used by some smoker. It may be the holder had become tilted over or lifted above the tank or water seal, so as to admit air beneath the lower edge. A match carelessly dropped into the tank outside the holder would then communicate flame to the ingoing current of mixed air and gas, and the consequences above described would inevitably follow. This is the most plausable theory we can at present assign for the accident.

If the holder was canted or tipped to one side so the bottom was lifted above the water seal, the outflowing gas would mix with the air in the annular space in the tank and become explosive, if a flame came in contact with it. Now, we have seen a report since the above was written, that a pipe has been found at the foot of the column, where the victim of this accident was sitting. What is more probable than that he, while waiting for his dinner, lighted his pipe and dropped the match into this explosive mixture in the annular space at the foot of the tank. The result would be precisely what occurred, to first "lift up" the holder, and then "press it down" collapsed at the top by the blow or sudden pressure of the atmosphere, together with the partial vacuum formed within the holder.

This theory would away with the theory of internal explosion, and also of an explosion on top (as has been suggested by some writer,) "owing to gas escaping through numerous seams," which is quite improbable, not to say impossible.—Eds.]

On the Inflaming Point of Vapors.

Various fluids occuring in the trade volatalize, as is well known, at ordinary temperatures, forming explosive mixtures with atmospheric air; others give off vapors at a somewhat higher, but still comparatively low temperature.

W. R. Hutton, of Glasgow, has recently determined the degree of heat at which the vapors of a number of explosives take fire from a burning candle, when it is approached to the surface of the fluid at a distance of 1 5 in. or 0·5 inches. Ther esults of these experiments are recorded in the subjoined table:

	Specific weight.	Inflaming point in degrees of Fah. At a distance of 1·5 in.	At a dist. of 0·5 in.
Sulphuric ether	0.747	below 53°	—
Bisulphide of carb.	1.279	" 53°	—
Petroleum benzine	0.706	" 53°	—
Benzole from coal tar, 90 per cent.	0.861	" 74°	71°
Crude parafin oil	0.849	" 74°	72°
Crude naphtha	0.884	" 78°	74°
Whiskey	0.940	" —	85°
Wood naphtha	0.849	" 87.8°	81°
Crude parafin oil	0.891	" 89°	84.2°
Curde naphtha	0.881	" 90°	86°
Dutch gin	0.630	" —	90°
Wood spirit	0.827	" 96.8°	84.3°
Illuminating naph'a	0.859	" 100°	91°
Wine spirit	0.817	" 104°	73°
Whiskey, 15 o'r pf.	0.893	" 109°	82°
" 11 o'r pf.	0.905	" 110°	84.2°
Kerosene	0.801	" 118°	110°
Light oil f'm coal tar	0.920	" 119°	100°
Spirit from resin	0.922	" 122°	105.8°
Turpentine	0.875	" 130°	119°
Sherry wine	0.993	" —	130°
Port wine	1.003	" —	130°
Refined parafin oil	0.909	" 134°	123°
" "	0.841	" 138.2°	127°
Fusel oil	0.850	" 140.°	129.2°
Oil from resin	0.986	above 212°	—
Heavy tar oil	0.950	" 212°	—

From this table it may be seen at a glance that the specific weight has, on the average, an influence on the temperature at which the generations of vapors take place. The cause of this property may be inferred from the fact that the fluids in question consist of mixtures of various compounds, of which the lighter generally escape first. This is the case with the two kinds of crude naphtha and the illuminating naphtha, from which the benzole has been separated by distillation. The crude naphtha of the specific gravity of nearly 0.89, contained considerable portions of tarry substance and naphthaline, but it nevertheless took fire at a lower degree of heat than refined naphtha, the specific weight of which did not exceed 0.86. That a liquid which contains but a small amount of a very volatile fluid may be dangerous, is seen, for instance, in the experiment with the light oil from coal tar. This oil inflames by the light of a candle at 119° Fah. when approached within a distance of one and a half inches. When compared with the great inflammability of bisulphide of carbon or benzole, the tar oil may be considered as of little danger, but it is just as dangesous when it is taken into consideration that the great inflammabillity of bisulphide of carbon is well known, while the tar oil is looked upon as being comparatively harmless. In the preceeding case, the liquid portion, which generated inflammable gases at 119 Fah., did not amount to two per cent of the whole, and after their separation, vapors were not given off below 179.5° Fah.

Transpiration of Gases.

The Engineer reports a lecture delivered recently at the Royal Institution, by Dr. Odling. He said that in the passages of gases through capilliary tubes, the same quantity of any one gas will pass in the same time, all the conditions being equal whatever may be the material of the tube; probably because the sides of the tube are lined with a still layer of the gas, so that the moving portion does not touch them, "Each gas has its own rate of transpiration, hydrogen traveling through the orifices much more rapidly than oxygen. If the two gases be mixed, the rate of transpiration will not be that of the mean between the two gases, but the rapid hydrogen will impress its rate upon the slow oxygen, a fact at present which is quite inexplicable. When the capillary tubes are very small indeed, gases diffuse through them at entirely different rates, which rates are inversely as the square roots of the specific gravity of the gases. When hydrogen diffuses into the air, it travels at the same relative rate as into a vacuum, but not at the same real rate: whenever one gas diffuses into another, there is reciprocal action; and when four parts of hydrogen diffuse into air, one part of air will diffuse into hydrogen, so that there is an effective pull of three volumns of hydrogen. To show this diffusion, Dr. Odling took six long tobacco pipe stems, and connected them together at the ends with joints of black inbia rubber tubing. He then decomposed water in a flask, by means of electrical, and allowed the explosive mixture of oxygen and hydrogen to pass along the bore of the pipes. The hydrogen all diffuses out through the substance of the clay, whilst one fourth its bulk of common air diffuses inward. Nothing, therefore, was delivered at the further end of the pipes but a nonexplosive mixture of oxygen and common air. He then held up a long glass tube with a bulb at the end, and asked the listeners to assume the globe to be a cell or the lungs, which in expanding and contracting, causes air to flow backwards and forwards through the tube. This explains the mechanical action of the lungs, and it is believed that they take up oxygen from the air by diffusion. Ether will diffuse more rapidly into hydrogen than into air. Gases will also pass through other than capillary and porous septa; they will pass through cold, soft, colloid substances, such as india-rubber, albumen, and some of the metals, but the rate of passage is again altogether different."

MISCELLANEA.

Ventilation by Air Fountains.—A mode of ventilating churches, halls, etc., by means of jets of fresh air passing through pipes to the centre of the space to be ventilated, and above reach of the heads of those present; in conjunction with ways of egress for the foul air through the floor, after being cooled by the fresh air mixed with it, is proposed by Mr. R. Moffat Smith, of Manchester, architect. The system of ventilation, Mr. Smith observes, could be combined with warming apparatus. The fresh air would enter the central space through ornamental tube standards, or could descend from the roof, as in a ball-room, although the jets would be turned upwards. By means of valves or taps the air could be regulated at pleasure.—*London Builder.*

New Coal Fields in Washington Territory—Edward Giddings, Esq., Chief Clerk of the Surveyor General's Office at Olympia (W. T.), informed the editor of the *Oregon Herald* that parties have recently discovered the largest and deepest coal beds ever before found in that territory, located near the military road between Claquato and Shohkum Church. He, together with three others, have entered 1400 acres of land covering this mine, and he is on his way to New York to negotiate a sale of shares therein. The discovery is said to be the most important of the kind yet known, and he seems quite sanguine that its proceeds will yield an immense reward.

The Suez Canal.—In view of the speedy opening of the Suez Canal, various experiments are being made in the part already finished, to ascertain how fast steamers can go in it, and how rapidly sailing vessels can be drawn through it without injury to its sides. The length of the canal is about 110 miles, so that at ten miles per hour, only eleven hours need be occupied in passing from sea to sea. A steamer of 2,000 tons burden is in course of construction at Hartlepool, England, at present, designed to traverse the Baltic in summer, and to run by the Suez Canal to the East Indies in winter. At Newcastle other steamers of 1,400 and 1,500 tons are being built to carry out pit coals and bring back Indian cotton.

Mont Cenis Tunnel.—The Italian papers state that the great tunnel through Mont Cenis is making very satisfactory progress. From October 16 to October 31 the distance excavated at the Southern end was 28 metres, and at the northern 34 metres, making together 62 metres. The average of the previous fortnights for some time has not exceeded 50 metres. The total length of the tunnel is to be 12,220 metres, and the length already completed is 8,958 metres, so that there now remain 3,262 metres to excavate. Under any circumstances, it is thought the entire undertaking will be finished by the commencement of 1871.

Maryland Coal Trade.—For the week ending April 10, there were shipped over the Baltimore and Ohio Railroad 19,280 tons of coal, against 15,930 tons for the same week last year. This is the heaviest shipment of coal that has ever been made over the Baltimore and Ohio road in one week since the opening of the road. The total amount of coal shipped from this region since the 1st of January is 264,927 tons, being about 100,000 tons in excess of the amount shipped for the same time last year.—*Cumberland Telegraph, April* 22.

Recent American Patents.

Pertaining to Gas, Water. Etc.

89,856.—Cock for Water Closets.—Hugh H. Craigie, New York City.

89,996.—Steam Generator.—Jonathan M. Clark, New York City.

89,952.—Apparatus for Supplying Air to Hydro-carbon Burners.—James Stratton, assignor to W. W. Glenworth, Philadelphia, Pa.

89,988.—Distillation of Hydro-carbon Oils.—Henry Grogan and George T. Lane, New York City.

89,998.—Apparatus for freeing Petroleum and other Liquids from Gas.—Albert H. Hook, assignor to Smith Gardner, New York City.

90,000.—Turbine Water-wheel.—Abijah Hubbell, assignor to himself, George V. Capron, and E. P. H. Capron, Salisbury, Conn.

90,012.—Carburettor.—Edmon L. Mix, Rochester, New York.

90,019.—Steam pipe for Reversing Steam Engines.—Joseph B. Pedrick, assignor to himself and Joseph F. Gent, Columbus, Ind.

90,633.—Steam-generator.—Thos. H. Speakman, Camden, N. J.

90,067.—Purifying the Waste Gases from Copper-roasting Furnaces.—Artemus Bigelow and Jas. S. Baldwin, Newark, N. J., assignors to Henry Martin, Baltimore, Md.

90,083.—Steam generator.—Anthony Demarce, Fairfield, Iowa.

90,127.—Water-heater.—Thos. Shaw, Phil'a, Pa.

90,128.—Hot-air Engine.—Philander Shaw, assignor to Shaw's Union Air-engine Company, Boston, Mass.

90,167.—Water-wheel.—Thomas G. Hall, Beach Haven, Pa., assignor to himself and Daniel F. Leybert, Salem.

90,204.—Turbine Water-wheel.—George C. Stephens, West Townsend, and Jas. F. Stephens, Fitchburg, Mass.

90,238.—Water-purifier and Cooler.—J. A. Casey, Maysville, Ky.

90,259.—Gas Machine.—C. C. Hare, Kansas City, Mo.

Prices of Gas Coals—June 2.

PROVINCIAL.

Duty, $1 25	Coarse. Gold.	Slack. Gold.
Block House	$1 75	$1 00
Gowrie	1 60	0 90
Lingan	1 75	0 75
Sydney	2 13¾	0 71½
Pictou (Albion)	2 25	1 25
Pictou (Acadia)	2 00	1 00
Little Glace Bay	1 60	0 90
Caledonia	1 60	0 75
International Co.'s Union Mines	1 60	0 75

Free on board vessels at the mines—uayable in gold.

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co.	$8 90	$8 00
Despard Coal Co.	8 50	8 00
Penn	8 90	8 00
Newburgh Orrel Gas.	8 50	8 00
West Fairmount Gas Coal		7 00
Powelton Gas Coal	8 00	7 00

Delivered in New York.

PRICES OF FOREIGN COALS—Duty $1.25 per ton.

Liverpool Gas Caking	$ 9 50
" " Cannel	14 00
" House Cannel	18 00@19 00
" " Orrel	16 00@18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverpool House Orrel, scr'd	$16@$18
" " Cannel, scr'd	18@$22

Per ton, 2000 lbs. delivered.

Ruling Prices of English and American Gas Coals between 1866 and 1369.

English Caking Coal	$9 to $12
English Cannel	10 to 17
Ex ship.	
Despard (American) Coal	$8 to 9½
Westmoreland	8 to 9½
Pennsylvania	8 to 9½
Block House (Cape Breton)	8 to 10
Albert Cannel (New Brunswick)	35

Liqnid Fuel in France.—An American who signs himself "H. H. H.," writes from Paris to the *Scientific American*, describing a practical test recently witnessed by him in that city, of the working of an American invention for the use of liquid fuel in steam making. The engine was of 15 horse power. The fuel used was "the refuse of oil," at the rate of two gallons per hour. Its cost was three cents per gallon say $7 per ton. A ton of coal,—he say,—will occupy 44 cubic feet; liquid fuel only 33,—and the latter will evaporate more than twice as much water as the former. The labor required is moreover only about one tenth that necessary for managing a coal fire. "After several hours running it was found that the ratio of oil consumed, to the evaporation obtained, had diminished to about one-half the amount used at first."

The writer says that capitalists have bought the patent for several European countries, at a high figure. The inventor considers the plane specially applicable to metallurgical processes, and has designed and patented furnaces for such processes which are calculated for the use of liquid fuel. The scientific and practical gentlemen who were present at the trial, unanimously gave it as their opinion that the use of liquid hydro carbon as a fuel was a "success."

"Bourbouze."—The new Frence gas light under this name is thus prepared: Coal gas, intimatly mixed with atmospheric air, is urged by gentle pressure through a tube, and passes through a metal plate full of little holes. Many jets are thus formed, which, after being driven through a fine tissue of platinum wire are lighted. The platinum soon becomes white hot, and so brilliant that the eye can hardly bear it. One cubic metre of gas is consumed per hour.

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NOTICE.—Manufacturers of our line of goods who have not already had communication with us will please forward us descriptive and price list of the goods manufactured by them, that we may show our customers that no additional charges are made to your standard list. 226

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AND

CHEMICAL REPERTORY.

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Consulting Chemist,
Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

WEDNESDAY, JUNE 2, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. News-dealers will please send orders to them.

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NOTICE.

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TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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FACTS ABOUT GAS FOR THE PEOPLE.

HOW TO READ THE METER.

There is no valid reason why consumers of gas should not be able to read the meter for themselves, and know exactly the amount of gas that is consumed. The meter is placed in every dwelling, giving equal privilege to the consumer as well as the Gas Company, to learn by its self registering index the amount of gas consumed. If this knowledge was general, it would remove silly predjudice, that great "bone of contention" between those who pay for the gas and those who receive the pay, for it is a faithful arbiter and gives no favor to one more than another.

The meters (both wet and dry) in ordinary use will be found to have three indices, the hand on the first or right hand index moves to the right as the figures read, and each index begin at a cypher (0) at the top and reads, 1 to 2 to 3 and so to the cypher again, which is 10. When the hand on the right index has moved to 1 it indicates that 100 cubic feet of gas have been used or passed the meter; when it points to 5 it means 500 feet, and after completing the circuit at (0) it is 1000 feet. Each of the indices are ten fold multipliers of the one preceeding. Single figures are used for want of room, but the multipler is generally placed above the index, thus the right hand is "one thousand" the next to the left or middle index is "ten thousand," and the last or left hand index is "one hundred thousand." Therefore on the first or right hand index, 1 on the dial stands for 100; in the middle index 1 stands for 1000; and 1 on the right hand index stands for 10,000 and so in this ratio with the succeeding figures respectively.

To read the meter, begin with the left index and write down the figure last passed by the pointer; then write down the figures last passed on the second index, and proceed in like manner with the third or right hand index. Now add two cyphers (00) and it will give the amount of gas registered in cubic feet. Suppose the first index was 2, the second index 5, and the third index 6, making 256, now add two cyphers and you will have 256,00, being the amount of gas used at that time.

At the end of the month (or at any other time) read the meter again and the figures will read—say 26,500 after adding the cyphers; now deduct the first sum from the last and you will have the difference 900, which indicates the number of feet used since the first reading.

A few minutes practice at reading meters, generallly called "taking the meter," will make any one quite familliar with the matter, and will give the gas consumer a wonderful degree of satisfaction, and often bring about a much better feeling toward the Gas Company who supply the gas. Among others things it will show you

HOW TO DETECT ESCAPING GAS.

If your gas bills seem too high, or you have the evidence of escaping gas by sense of smell, but not positively so; take a reading of the meter when no burners are in use, and after an hour or so repeat the reading, and if gas is escaping it will be shown. To detect the locality of the leak is often a more difficult matter. The first thing is to see that no burners have been left turned on by accident, which is often the case where the cock has no *stop*, and is caused by the cock being turned partially round again so as to open the vent. Imperfect stop cocks are for this reason dangerous, and should be at once removed.

The next thing to do in order to detect a leak is to try the joints of the gas fittings. The sense of smell will frequently be sufficient by bringing the face near the suspected joint; a lighted taper or match held near the joint is a more certain plan. If gas is escaping it will take fire at the leak, or if too little to burn steadily it will momentarily catch and extinguish in little puffs.

Sometimes the gas escapes from the joints or imperfect piping between the ceiling and floor, or behind the walls or casings.

If beneath the floor the sense of smell will generally detect the section of the floor under which the leak is: as it escapes owing to its levity upwards through the crevices of the floor, and penetrates the carpet if there be one. If bracket or side burner are used, and the escaping gas is behind the walls or casings, the crevices in the casings, or the opening when the pipe enters the room, will let the escaping gas enter the room sufficiently at these points to indicate somewhat nearly the location of the leak.

In such cases the proper cause is *never* to apply a light to the crevices or casings, but to turn off the gas at the meter and send for a gasfitter, otherwise an explosion may occur involving serious consequences. In ordinary leaks of gas fixtures and pipes, whether at the joints or at the attachment of the burner, the fitting or burner should be unscrewed and white lead or common bar soap rubbed in the threads, and then screwed home again. This can be done often without any aid from a gasfitter.

BERRY'S PREMIUM FIRE PROOF BRICK WORKS.

It is a pleasant and striking feature in the history of the development of the various industries of our country, that their growth and progress are rapid beyond precedent. It is also remarkably noticeable that the exclusive monopoly which the old world has enjoyed for so many years, of supplying us certain peculiar manufactures, is dying out to a great degree, because we supply ourselves with the same articles of quite as good, and often a superior quality. We no longer depend upon Europe for iron and steel; our domestic brands equal and supersede in quality and cheapness any that can be imported. Russia has no longer the monopoly of the sheet iron trade, Sweeden of steel, or England of cutlery, etc., and porcelain is not alone the product of Europe henceforth, and so we might extend the catalogue if we chose. Our enterprise and industry is making us independent of foreign manufactures, and soon we shall, owing to our great and increasing resources, compete to supply not only our own, but any market of the world.

The special industry of manufacturing fire brick, tile, drain pipe, and chemical and gas retorts, etc., has attained a degree of development and excellence here, which places us in the front rank of competition with the world.

The great monopoly which England has so long held of supplying us, is one of the things of the past; a reminescence only of the history of our progress. It is not any more absurd to carry "coals to Newcastle" than to import Hamburg and English brick and tile to this country. The famous term, "Stourbridge brick," has lost its significance, because we have *home brands* that are quite equal in make and finish, and superior in quality.

Of the various manufactories in this country of fire brick, tile, etc., we are able to refer, from our own knowledge, to Berry's Premium Fire Proof Brick Works of Baltimore, Md., owned by Messrs. John S. and George R. Berry, successors to John and Thomas Berry. These works were established in 1812, and have, therefore, the experience of 87 years to attest the quality of their manufacture. The thorough knowledge these gentlemen have of the materials employed in the composition of the various kinds of brick, tile, retorts, etc., and their appreciation of the wants of the country, are matters materially to their credit.

They had the premium awarded them by the Maryland Institute for fire brick made by them, equal to English Stourbridge, and the great increase in their business has necessitated the occupancy for their works of an entire block, bounded by Russell, Warren, Hamburg, and Cross streets. Here is made the various kinds of brick, etc., adapted to the use

of Iron, Copper, Crome, and Gas Works; also smelters and refiners of metals, of glass works, and refiners of sugars, etc.

Their facilities are such that they can supply the exact size and forms to correspond with the drawings and patterns supplied them, or they can supply at short notice from their own large collection, almost any conceivable design, pattern, or style.

A few of the various testimonials and certificates which these gentlemen have received may be mentioned: Messrs. E. T. Ellicott & Co, of the Iron Works, and agents of the Alvalon Copper Works, Patapsco Falls; Mr. Chas. Reader, Iron and Steam Engine Foundry; Messrs William Miller & Co., Iron Foundry; Mr. Thomas Irwin, Sugar Refiner; Ebenezer Hubbell, Brass Founder; J. Mowton Saunders, Engineer Gas Works—all of Baltimore, Md. Mr. Cadwalader Evans, Superintendent Columbian Foundry, Georgetown, D. C.: U. S. Navy Yard, Washington; U. S. Gov't, Agt., Harper's Ferry, etc.; all of whom testify that the Berry Premium Fire Proof Brick are equal, and some say, superior to the English Stourbridge brick in regard to uniformity of size, freedom from shrinking when hot, not cracking readily when cooled off, and capacity to bear high heat.

Surely, these evidences should settle the question of our capability to produce American fire brick, tile, etc., and that we are no longer subject to use the expensive imported article, which has heretofore been introduced into this market.

It is a matter of just pride that these gentlemen have so fully established the success and value of a domestic manufacture, of such importance to the country as this. We take pleasure in referring to their advertisement, which will be found in another column.

NEW GAS WORKS AT FLUSHING, L. I.

We gather from the *Flushing Journal*, dated 7th May, interesting items of the building of new gas works, and the final introduction of gas to supply the citizens in January last. The old works being inadequate to supply the demand, and having several times left the village in "Cimmerean darkness," the company most sensibly employed the skilful and well known engineer of the Williamsburgh Gas Works, Mr. Joseph R. Thomas, to construct the works for them.

The retort house is 43 x 32 feet—20 feet to cornice; material brick, with iron roof-frame carrying a slate roof, making a fire-proof structure. It contains three benches of five retorts in three's, with space for two additional when necessary.

The purifying house is 28 by 30 feet, same height as the retort house. This building contains the purifiers, condensers, and washing apparatus. Adjoining the purifying house is the "lime house," for storing lime. It is also a brick building 14 by 20 feet, covered with slate.

The office building contains not only the offices, but the work shop in the basement; also the valve room, and a well partitioned boiler and pump room. The first floor has the office and meter room, which also contains the governor.

In addition to the old gasholder, Mr. Thomas has erected a new one of 28,000 feet capacity. The mason work was done by Messrs. Hance & Downing, and the carpenter work by Mr. Edward Roe. The works are represented to be complete and ornamental, and are a very creditable evidence of the engineering skill and taste of Mr. Thomas.

The building committee consists of Messrs. C. A. Willets and Charles Lever, who seem to have given much satisfaction to the citizens in carrying out the new enterprise.

ENTERPRISING.

The Bloomington Gas Light and Coke Company, (Ill.) advertise to "fit with gas pipes all dwelling houses on streets where gas pipes are now laid, at 10 cents per foot," or 60 per cent less than the actual cost and labor. They also offer to supply gas chandeliers and fixtures, etc., at "cost price." This proposition is signed by C. W. Douty, Superintendent of Gas Works, and W. Parrett, Superintendent of Gas Fittings, and evinces a degree of liberality and enterprise which will be acceptable to the citizens of Bloomington, and eventually prove to be a gain to the company. The "bread cast upon the waters" will return again.

Other gas companies may see here an example worth imitating. The cost of introducing gas in the first instance, causes many a would-be gas consumer to continue to use lamps and candles, with all their disagreeabilities, against their will.

THE GAS COMPANIES OF ST. PETERSBURGH, RUSSIA.—As an evidence of the extensive and extended circulation of our Journal, we take pleasure in placing before our readers a statistical statement, forwarded to us at the instance of L. Chandor, Esq., formerly of New Orleans, a subscriber at that place, who is largely engaged in gas matters in Russia. The Report was kindly supplied by George Pomutz, Esq., U. S. Consul. The Report shows the receipts, expences, and profits of the two great gas companies at St. Petersburgh. It will be seen that the profits are nearly one half of their receipts, which must be very encouraging to its managers. As our readers may not be acquainted with the currency of Russia, we append the following for their information: A rouble is worth 79 cents gold, a copeck 3½ cents, and a pood is equal to 36 lbs.

Answers to Correspondents.

J. D. C., of Penn.—We will require to know more definately the size of the works you propose to change and the probable increase of the consumption of gas per year. The Petrolio-Calcium process, from all that we know at present, is not calculated to compete with coal gas, unless it be in certain localities where still foots or residuum is plenty and cheap and coal dear, and then only in works on a small scale. Mr. J. B. Thomas the efficint engineer of the Williamsburgh Gas Works has examined it carefully, we believe, and condemned it as not being a practical improvement for general use. There is nothing new in the process, exceptt he application of lime in the retorts. It is substantially the plan invented many years ago by Mr. Chaussenot for making gas from coal tar, resin and oils, fully described in "Appletons Dictionary of Mechanics," page 176. So far as using petroleum residuum or the like, in combination with poor coals to enrich the gas, the process may have somemerit.

B. W. of Ohio.—Coal tar should be used with the slate. It is a very different material chemically from the petroleum tar.

E. M. R. of Phil.—Parrish's Gas and Air Mixer does not increase the illuminating power of gas, it dilutes the gas, and 40 per cent. atmosphere mixed with ordinary petroleum gas gives a good candle standard. Where air is added large burners are used.

B. S. I., of Norwich Conn.—Hawley's Aubin Gas method is a good one, and we think as good a plan as any for small works. By diluting your gas you can give a satisfactory light, with less liability to condensation in the pipes and mains, and consequent loss of illuminating power, and of course the cost will be less to your company. "Deave's petroleum gas process" is also good.

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The regular price to non subscribers is $5, which should be sent either in Check, Post Office Order, or Registered Letter.

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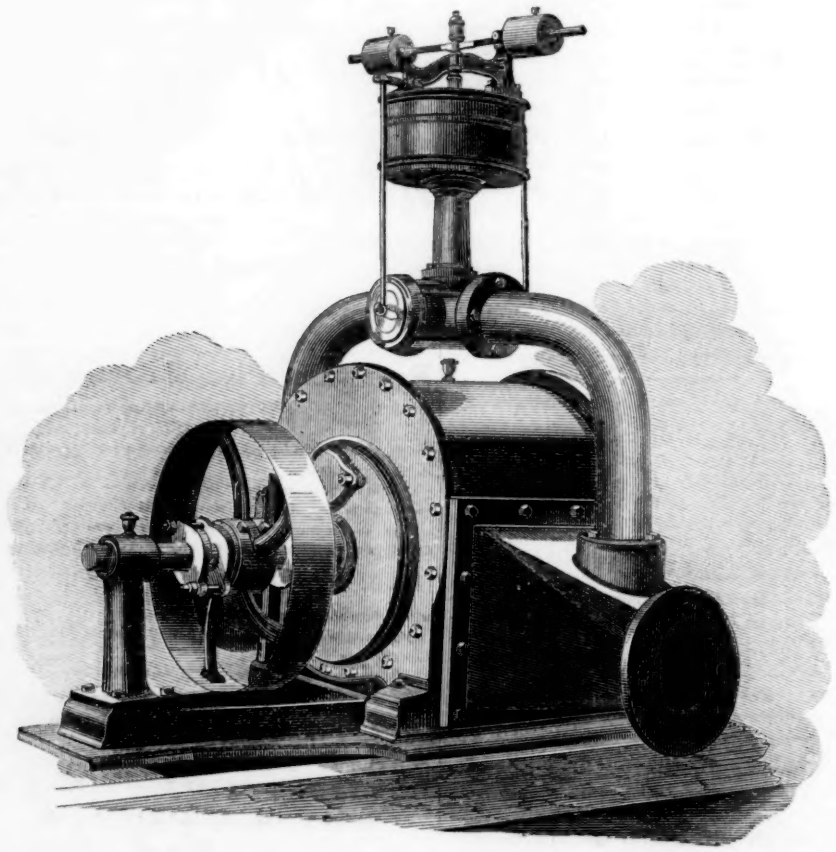

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.
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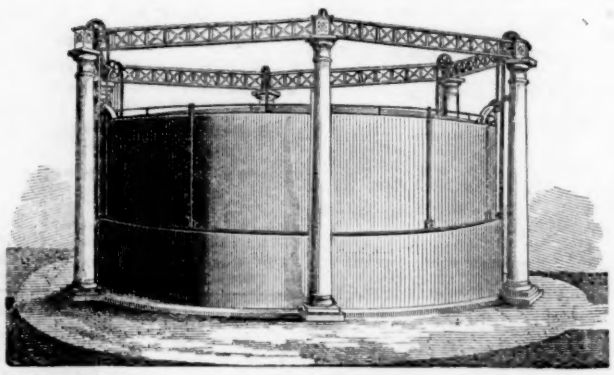

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FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate.

Fig. 3, a section through body, gate and wedge, intended for larger sizes of water valves required to bear heavy pressure either side.

The slides, G G, are held against wedge D, by ribs, H H, projecting from sides of valve body, A.

In closing the valves, when opening I is covered, slides, G G, pass the lower ends of ribs, H H, when the wedge, D, can move forward on the inclined planes E E, and crowd the gates apart.

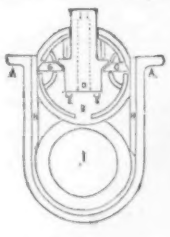

FIG. 3.

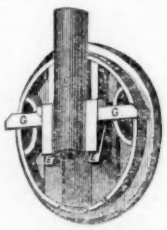

FIG. 2.

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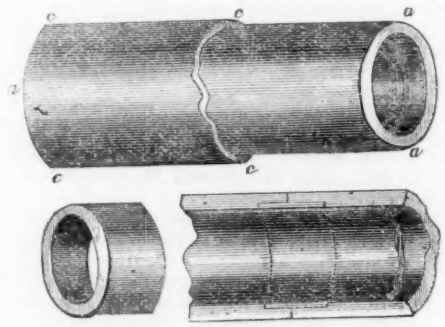

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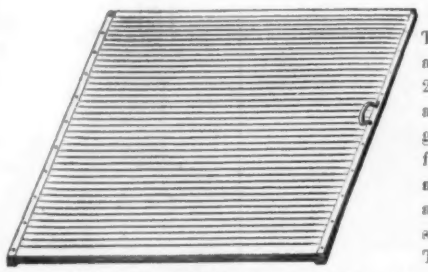

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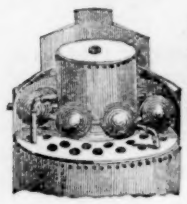

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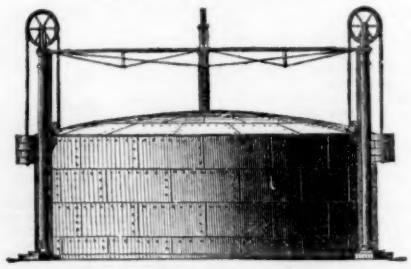

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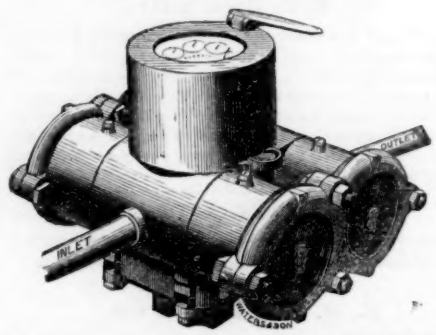

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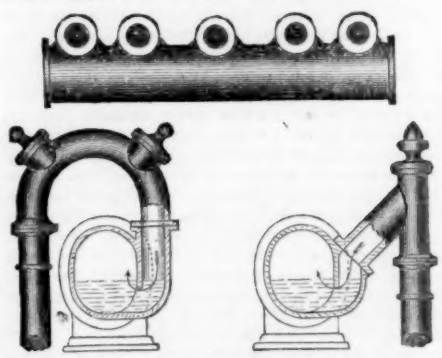

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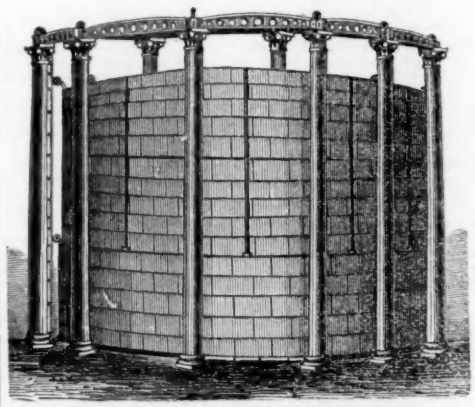

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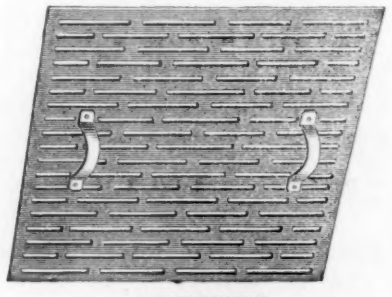

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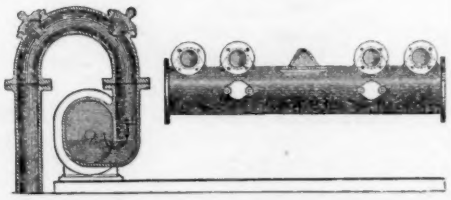

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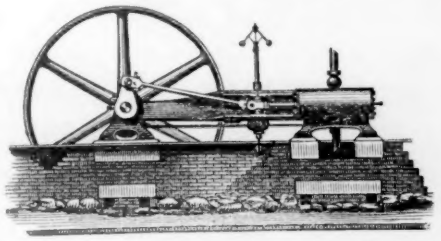

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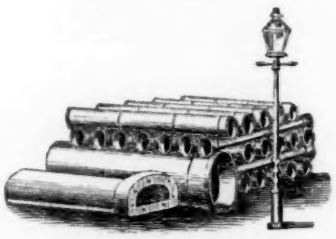

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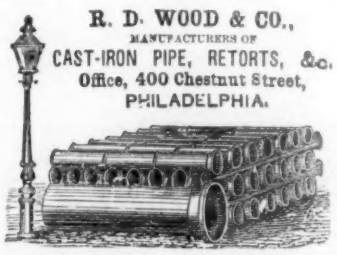

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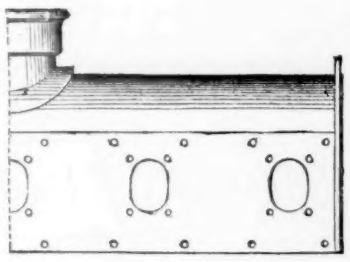

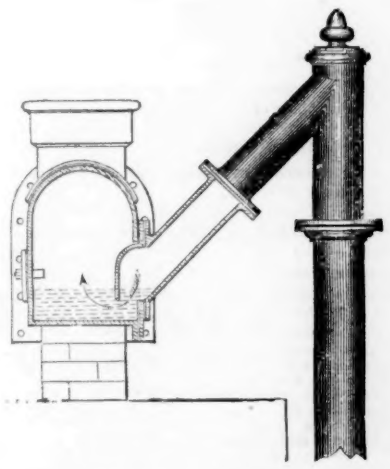

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